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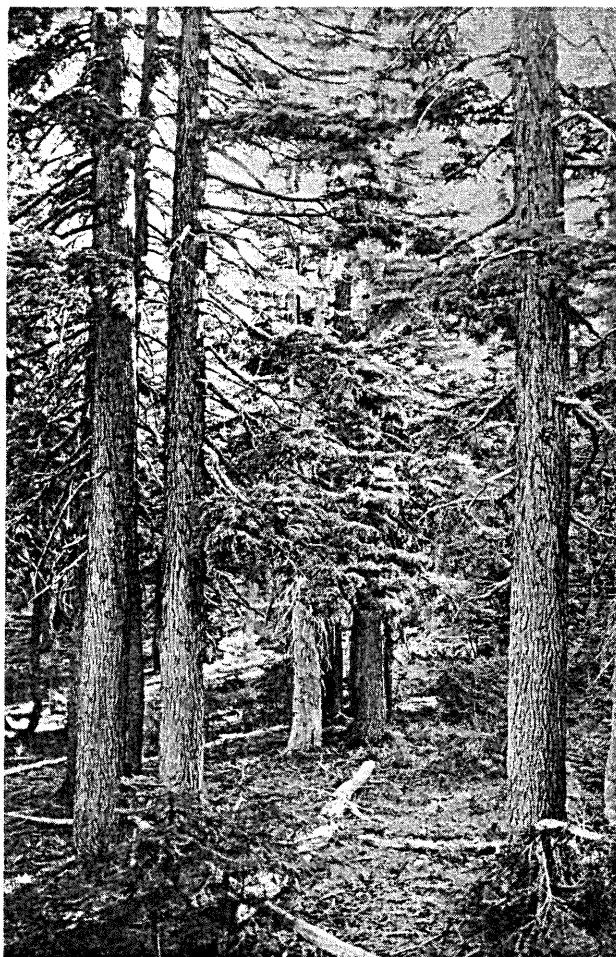
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SILVICAL CHARACTERISTICS of MOUNTAIN HEMLOCK

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SILVICAL CHARACTERISTICS OF MOUNTAIN HEMLOCK

by

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Mountain hemlock (Tsuga mertensiana)^{1/} is usually a medium-sized to small tree. It ranges (fig. 1) northward from the south fork of Kings River in California (lat. 36°40') along the Sierra Nevada, the Cascades, and the coastal mountains of British Columbia, to the Kenai Peninsula in Alaska (lat. 61°10'), (10, 11).^{2/}

Common names that have been used for mountain hemlock are: black hemlock, Patton spruce, Williamson's spruce, hemlock spruce, alpine spruce, and alpine hemlock (3).

Mountain hemlock was the preferred species for ties during the construction of the Alaska and Copper River railroads. The wood is but little used at the present time, mainly because of its inaccessibility. In the Prince William Sound region of Alaska, however, where the species is accessible, it is cut into lumber and sold with western hemlock (Tsuga heterophylla) without species distinction.^{3/} Regardless of future uses of the wood, watershed protection is likely to be one of the principal uses of the tree, because it grows mainly on areas of high watershed value.

^{1/} Scientific and common names of trees in this publication follow: Little, Elbert L., Jr. Check list of native and naturalized trees of the United States (including Alaska). U. S. Dept. Agr. Handb. 41, 472 pp. 1953.

^{2/} Underscored numbers in parentheses refer to Literature Cited.

^{3/} Information furnished by Alaska Research Center, U. S. Forest Service.

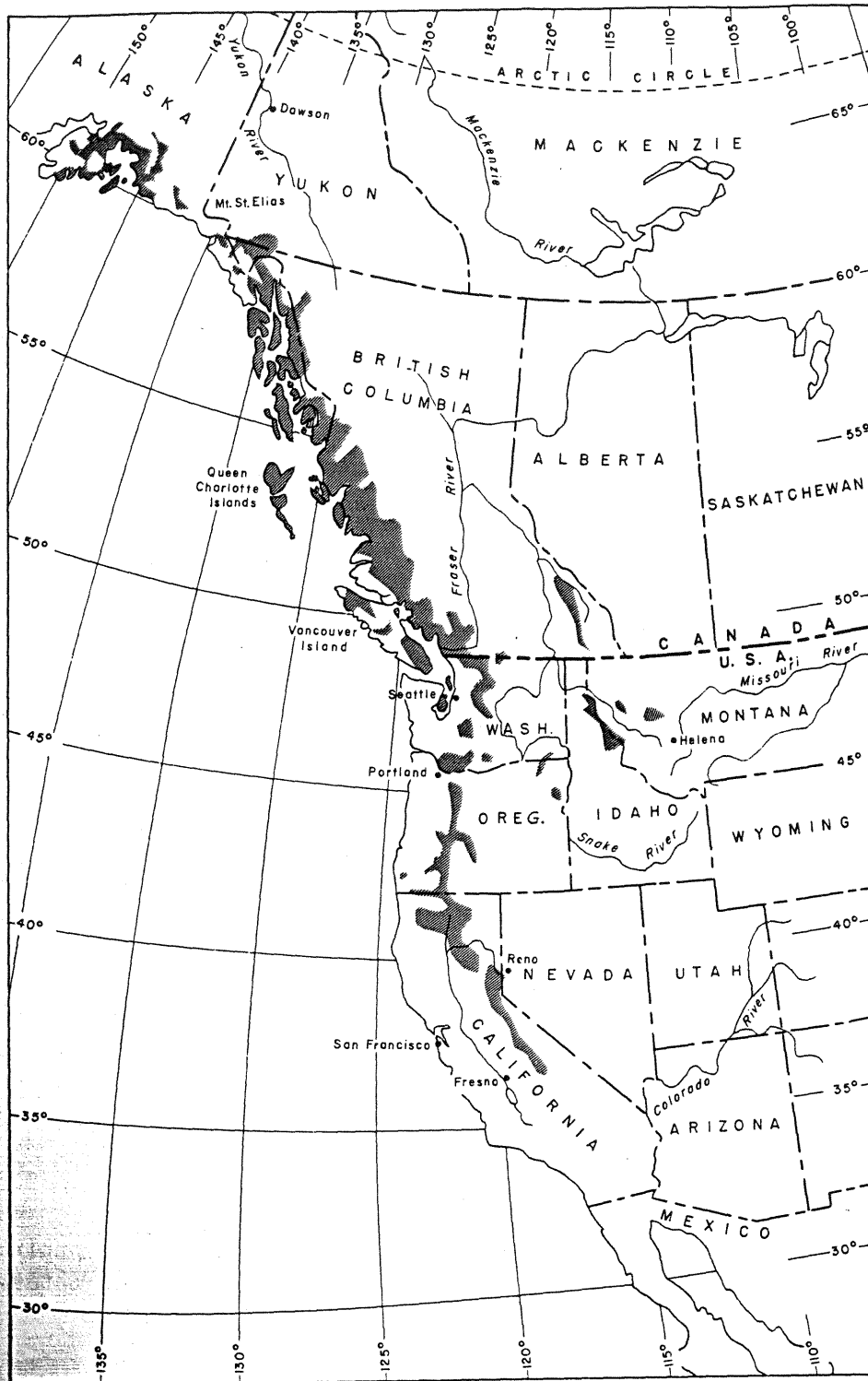


Figure 1.--Range of mountain hemlock.

HABITAT CONDITIONS

Climatic

The principal climatic features of the mountain hemlock zone are long, cold winters; short growing seasons; and high precipitation, with a large part of it falling in the form of snow. Records from weather stations within the mountain hemlock growth zone in Oregon, Washington, and Alaska (6, 12, 14, 15) show a range in temperature from -20° to 101° F., a range in average annual precipitation from 41 to 145 inches, and a range in number of annual frost-free days from 79 to 149. Greatest precipitation and longest frost-free period is shown for Alaska.

Weather stations are generally sparsely distributed over the range of mountain hemlock and are nonexistent in large areas such as the high Sierra of California. Therefore, it would not be surprising if weather extremes cited were all exceeded within the zone where the species grows.

Edaphic

Mountain hemlock prefers loose, coarse-textured, well-drained soils wherever sufficient moisture is available (10, 11).

Physiographic

Extensive stands of mountain hemlock sawtimber are found near sea level in Alaska.^{4/} Southward in its range, it is found at higher elevations as an important component of the subalpine forest zone. It commonly occurs at 5,000 to 7,000 feet in the Cascade Range, at 5,500 to 9,000 feet in western Montana and northern Idaho, and at 6,000 to 11,000 feet in the Sierra Nevada of California (5, 10, 11).

The tree reaches its best development on flats and gentle slopes and at the heads of moist valleys or sheltered ravines. North slopes are preferred through most of its range. It is often abundant

^{4/} Information furnished by Alaska Research Center, U. S. Forest Service.

on high, exposed slopes but is usually stunted on such sites (11). Mountain hemlock also grows better on swamp and muskeg areas than most other species but does not obtain best development there. 5/

Biotic

Mountain hemlock is common in the Hudsonian and upper part of the Canadian Life Zones (1, 10). It usually grows in uneven-aged stands of mixed species or in even-aged pure stands of limited extent. Common associates in the northern part of its range are Sitka spruce (Picea sitchensis), Pacific silver fir (Abies amabilis), 6/ western hemlock, subalpine fir (Abies lasiocarpa), and Alaska-cedar (Chamaecyparis nootkatensis). Further south it is usually associated with whitebark pine (Pinus albicaulis), subalpine larch (Larix lyallii), Engelmann spruce (Picea engelmannii), and occasionally with lodgepole pine (Pinus contorta), western white pine (Pinus monticola), California red fir (Abies magnifica var. magnifica) or Shasta red fir (Abies magnifica var. shastensis) (10). The Society of American Foresters (9) lists mountain hemlock as a major component of the Mountain Hemlock—Subalpine Fir Type, and a minor component of the Red Fir Type, Whitebark Pine Type, and Western Hemlock Type.

LIFE HISTORY

Seeding Habits

Erect purple or yellowish-green female flowers borne at the ends of last year's lateral shoots develop into mature cones the same year. The male flowers occur on the same tree but on different branches. They are reddish purple and occur in catkins borne in the axils of the previous year's shoots. Cones are normally erect until about half grown, when they become pendulous. Occasionally--and then chiefly on dwarfed trees--they remain erect. Cones ripen and seeds are shed in late September and October (5, 10, 11, 13).

Mountain hemlock is a heavy seed producer and bears some seed almost every year. During years of heavy crops, which occur

5/ Information furnished by R. L. Schmidt, British Columbia Forest Service.

6/ Information furnished by R. L. Schmidt, British Columbia Forest Service.

every few years, cones are so numerous as to weigh down the branchlets and almost cover them. Some trees begin bearing cones by the time they are 20 years old (5, 10, 11). The small, brownish seeds equipped with large wings are well suited to distribution by wind (13).

Vegetative Reproduction

Hemlocks can be propagated by layering (13). Other forms of vegetative reproduction may be possible, but no examples were found in the literature.

Seedling Development

Only about half of the seeds are viable and then just for a brief period (11, 13). Germination takes place on either organic or mineral soil seedbeds if sufficient moisture is present, but mineral soil is preferred (11). Young seedlings grow best in partial shade (11).

Sapling Stage to Maturity

Growth and yield. --Mature trees usually range in height from 25 to 80 feet; they occasionally reach 100 to 125 feet on better sites and up to 150 feet in favored spots. Diameters, at 4-1/2 feet above the ground, vary from 10 to 20 inches over much of its range and occasionally from 30 to 40 inches on the best sites (5, 8). The largest diameter recorded by the American Forestry Association (1955) was 83.1 inches, but the tree was only 118 feet tall. On high, exposed ridges, mountain hemlock may develop as a sprawling shrub (10).

Mountain hemlock is thought to attain an age of 400 to 500 years (11). It grows so slowly that trees 18 to 20 inches in diameter are usually from 180 to 260 years old (11).

Reaction to competition. --Baker (2) rates mountain hemlock as tolerant, and Sudworth (11) says it surpasses all of its associates except western hemlock in this respect. However, Garman^{7/} reports Pacific silver fir as another more tolerant associate.

^{7/} Information furnished by E. H. Garman, British Columbia Forest Service.

Mountain hemlock seedlings and saplings readily survive long suppression and resume normal growth when light is admitted (11). Sudworth (10) reports natural pruning is usually poor, with some branch stubs persisting almost to the ground, even in crowded stands. However, Schmidt^{8/} reports good natural pruning in even-aged stands in British Columbia.

Damaging agents. -- Dwarf mistletoe (Arceuthobium campylopodum forma tsugensis) is a common and damaging parasite (4). Mountain hemlocks are sometimes extensively heart-rotted but are generally sounder than western hemlocks.

A number of insects attack mountain hemlock, but seldom kill any large number of trees. The black-headed budworm (Acleris variana) and the hemlock sawfly (Neodiprion tsugae) at times defoliate and kill or weaken mountain hemlock although this species does not appear to be a preferred host. The flatheaded fir borer (Melanophila drummondi) and hemlock engraver (Scolytus tsugae) commonly kill weakened trees. Various other insects bore into the wood of dying and dead trees and into unseasoned lumber (7).

RACES

There is no record of recognized racial variations of mountain hemlock. But, because of its wide range and variations in habitat, it is probable that racial variations do exist and will be recognized after further study.

^{8/} Information furnished by R. L. Schmidt, British Columbia Forest Service.

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